UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,073	05/14/2001	David Tucker	37357.0100	8589

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EXAMINER
HENEGHAN, MATTHEW E

ART UNIT	PAPER NUMBER
2134	

DATE MAILED: 05/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/855,073	TUCKER ET AL.
	Examiner	Art Unit
	Matthew Heneghan	2134

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>10 January 2005</u>.

2a)☐ This action is **FINAL.** 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-10,12,21-23,43-45 and 48-53</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-10,12,21-23,43-45 and 48-53</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>14 May 2001</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>12/6/01</u>.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1.   Applicant's election with traverse of claims 1-10, 12, 21-23, 43-45, and 48-53 in

the reply filed on 10 January 2005 is acknowledged. The traversal is on the grounds

that the Unity of Invention finding in the related international search report included

claim 57 in the elected group. This is not found persuasive because the standards for a

finding of Lack of Unity and for a U.S. restriction differ. In determining whether to restrict

U.S. applications, the Unity standard is ONLY applied in applications entering the

national stage under 35 U.S.C. 371. The instant application was filed under 35 U.S.C.

111(a); therefore, U.S. restriction has been applied. See MPEP §1893.03(d).

      The requirement is still deemed proper and is therefore made FINAL.

2.   Claims 1-10, 12, 21-23, 43-45, and 48-53 have been examined.

Priority

3.   The instant application claims priority to U.S. Provisional Patent Application No.

60/203,877, filed 12 May 2000.

Information Disclosure Statement

4.   The following Information Disclosure Statement in the instant application has

been considered:

IDS filed 6 December 2001.

5.   The third item in the IDS, France Patent No. 2693809, was not in English and

has not been considered.

Drawings

6.   The drawings are objected to as failing to comply with 37 CFR 1.84(l) because

figures 1-8 and 17-21 have lines that are not uniformly thick and well-defined.

7.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)

because they include the following reference characters not mentioned in the

description: 130, 150, 160, 170, 175, and 180.

8.   Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in

reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. Each drawing sheet

submitted after the filing date of an application must be labeled in the top margin as

either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the

changes are not accepted by the examiner, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings

will not be held in abeyance.

Specification

9.   The disclosure is objected to because it contains an embedded hyperlink and/or

other form of browser-executable code. Applicant is required to delete the embedded

hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

10.   The use of the trademarks Java, Visual Basic, InstallShield, Unix, Linux,

Appletalk, and BeOS have been noted in this application. It should be capitalized

wherever it appears and be accompanied by the generic terminology.

        Although the use of trademarks is permissible in patent applications, the

proprietary nature of the marks should be respected and every effort made to prevent

their use in any manner which might adversely affect their validity as trademarks.

Claim Objections

11.   Claim 49 is objected to because of the following informalities: Since the

execution of the encryption algorithm encrypts of the code polymorph, the execution of

the encryption algorithm cannot be a separate, prior event. It is being presumed that the

execution of the encryption algorithm is meant to teach to the determination of that

algorithm. Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

12.   Claims 1-5, 7-10, 12, 21-23, 43-45, and 48-53 are rejected under 35 U.S.C. 101

because the claimed invention is directed to non-statutory subject matter. Each claim

solely teaches to manipulation of abstract data, and is not tangibly embodied.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

13.   Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply

with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it

pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicant's specification merely refers to several methods for several recovery methods

that are not well-known in the art (symmetric correlation, asymmetric correlation, etc.)

without describing the methods. It is being presumed that any deobfuscation method

teaches to claim 23.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly
claiming the subject matter which the applicant regards as his invention.   ·

14.   Claims 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention.

Claim 3 recites the limitation "the polymorph produced in the preceding iteration."

There is insufficient antecedent basis for this limitation in the claim. It is being presumed

that this refers to the "second generation polymorph" recited in claim 2.

15.   Claims 2-4 and 22 are rejected under 35 U.S.C. 112, second paragraph, as

being incomplete for omitting essential structural cooperative relationships of elements,

such omission amounting to a gap between the necessary structural connections. See

MPEP § 2172.01.

Regarding claims 2 and 4, no limitation relates the respective claims to the

limitations of base claim 1. It is being presumed that the "first generation polymorph"

recited in the first limitation of each claim and the "second generation polymorph"

recited in claim 4 are generated similarly to the "first code polymorph" produced in the last limitation of claim 1.

Regarding claim 22, the omitted structural cooperative relationships are: No limitation shows how the original instruction code length calculation recited in the first limitation is related to the remainder of the invention. Since all modern computer systems maintain the sizes of files, this limitation is being deemed as inherent.

Claims 3 depends from rejected claim 2, and include all the limitations of that claim, thereby rendering that dependent claim incomplete.

Claim Rejections - 35 USC § 102

· The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16.   Claim 1-4, 6-10, 12, and 21-23 are rejected under 35 U.S.C. 102(b) as being anticipated by WIPO Patent Publication No. 99/01815 to Collberg et al.

As per claims 1, 10, the system disclosed by Collberg takes compiled code and obfuscates (i.e. creates isomorphic code) it in a random manner when possible. In order to determine when obfuscation is possible, the code must be scanned (see abstract; p. 53, line 21 to p. 55, line 16; and p. 68 line 14 to p. 69, line 9).

As per claims 2 and 3, Collberg further discloses the combining of multiple types

of transformations (at least three types are disclosed), thus creating later generation

isomorphs (see p. 53, lines 10-19 and p.86, line 27 to p. 89, line 22).

As per claim 4, Collberg discloses the generation of different obfuscated versions

of a program for different customers (see p. 98, lines 24-30).

As per claim 6, Collberg discloses Java® applications, which are generated at a

server and executed on a client (see entire document).

As per claim 7, Collberg discloses the insertion of inert (benign) code (see p. 42,

lines 4-27).

As per claims 8 and 9, the system is implemented on a stand-alone system

called "Kava," which may optionally use libraries (see p. 4, lines 13-15 and p. 25, line 25

to p. 26, line 15).

Regarding claim 12, 21, 22, compiled code comprises original CPU instructions.

Regarding claim 23, Collberg describes several deobfuscation algorithms (see p.

72, line 1 to p. 83, line 2).

17.   Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S.

Patent No. 5,696,822 to Nachenberg.

Nachenberg discloses that a polymorphic virus (i.e. self-replicating code)

provides each new file with a mutated (obfuscated) version of the virus, as this

frustrates most standard virus-detection schemes (see column 1, lines 11-17).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

18.   Claims 48, 49, and 51-53 are rejected under 35 U.S.C. 103(a) as being

unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No.

6,236,728 to Marchant.

Drake discloses the insertion of obfuscating code, which is isomorphic, in

appropriate places. Scanning the code is necessary to determine such places (see

column 5, line 37 to column 6, line 3). Drake also discloses the encryption of code after

obfuscation, and notes that the encryption scheme used can be subjected to substantial

variation (see column 16, lines 3-9).

Marchant discloses the use of random encryption algorithms, and suggests that

this gives higher security (see column 3, lines 11-16). The algorithms are determined

before the encryption takes place.

Therefore, it would be obvious to one of ordinary skill in the art at the time the

invention was made to modify the invention of Drake by using random encryption

algorithms on a per-security unit basis, as disclosed by Marchant, as this gives higher

security.

Regarding claim 51, Drake discloses a symmetric algorithm, DES, as an exemplary encryption algorithm; the combination of Drake and Marchant therefore would offer a symmetric algorithm.

Regarding claim 52, the invention of Drake is intended for try-before-you-buy software (see column 3, lines 1-6).

Regarding claim 53, Drake discloses the use of a signature key (a checksum) which prevents the successful decryption if the code has been tampered with (see column 16, lines 44-48).

19.   Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No. 6,236,728 to Marchant as applied to claim 48 further in view of U.S. Patent No. 5,966,450 to Hosford et al.

Drake and Marchant do not disclose the usage of a previous result for key generation.

Hosford discloses the results from previous iterations to generate keys (see column 5, lines 43-55), and further suggests that this increase the difficulty of unauthorized decryption (see column 4, lines 5-11).

Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Drake and Marchant by using the results from previous iterations to generate keys, as disclosed by Hosford, as this increase the difficulty of unauthorized decryption.

Allowable Subject Matter

20.   Claims 43-45 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 101, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

21.   The following is a statement of reasons for the indication of allowable subject matter: No art could be found that suggested a detection of tampering of obfuscated code by comparing two generated CRC's, one generated during code execution. The closest art, Drake, which uses checksums, and U.S. Patent No. 6,587,947 to O'Donnell et al., which uses CRCs, authenticate obfuscated code, do not use the values during execution.

Conclusion

22.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,480,959 to Granger et al. discloses several methods for software protection.

23.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Heneghan, whose telephone number is

(571) 272-3834. The examiner can normally be reached on Monday-Friday from 8:30

AM - 4:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Gregory Morse, can be reached at (571) 272-3838.

Any response to this action should be mailed to:
Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450
Or faxed to:
(703) 872-9306

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is (571) 272-

2100.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

MEH

May 16, 2005